

provided" (col. 3, lines 27 – 28). However Chen-Lieh does not disclose or hint at how such a water-preventing device would be constructed or mounted.

The valve disclosed by Ferraro is a water-preventing device that closes when the buoyant force of floating body 6 pushes plug 4 upward to cover the downward directed opening of breathing tube T. Conversely, Ferraro's valve opens when floating body 6 is not buoyed upward, which allows plug 4 to drop (due to its weight) thereby uncovering the opening of breathing tube T. Ferraro teaches: "The closing device is made of a material which is heavier than water, in such a way, that when the device is in the air, due to its weight, the breathing orifice is left open." (Col. 1, lines 33 – 36)

Because plug 4 must be buoyed upward to close, and drop downward to open, the valve disclosed by Ferraro will not function properly if the opening of breathing tube T is facing upward. In fact, the valve will always be closed (due to its weight) if it is mounted over a tube that opens upward (for example, the tube 10 disclosed by Chen-Lieh.) Consequently, Ferraro also discloses a breathing tube that makes a 180-degree turn ending with an inverted opening.

A state-of-the-art snorkel is designed to provide the lowest possible respiratory effort. It is well known by the art that a 180-degree turn of the snorkel conduit increases the respiratory effort needed to breath through a snorkel. Furthermore, it is well known by the art that any external obstruction in or near the respiratory flow path will also add significantly to the respiratory effort needed to breathe through the snorkel.

Ferraro discloses that breathing tube T makes a 180-degree turn, and that when the valve is open, as shown by FIG. 1, plug 4 is only slightly removed from the downward facing opening of breathing tube T. The 180-degree turn, and the redirection of respiratory flow around plug 4, causes a significant and detrimental increase of respiratory effort.

The respiratory problems presented by the teachings of Ferraro and

similar valves are well known by the art. Snorkels with inverted openings and corresponding valves have been found to snag easily, not seal reliably and, most important, significantly increase respiratory effort. Consequently such snorkels are considered obsolete and not state-of-the-art.

Employing Ferraro's valve on Chen-Lieh's snorkel would require that the upper opening of the snorkel be turned 180-degrees. A 180-degree redirection of the snorkel opening is contrary to the teachings of the instant invention. Such a modification, and the resulting close proximity of Ferraro's plug, would cause a significant increase in the respiratory effort needed to breath through the snorkel. Obviously it would be disadvantageous to incorporate the valve of Ferraro or a similar valve on the Chen-Lieh snorkel or any other state-of-the-art snorkel.

In contrast to the teachings of Chen-Lieh and Ferraro, the specification of the instant invention teaches: "Providing a substantially smooth flow path that is free of abrupt changes in path direction facilitates respiration and purging." (Page 7, lines 12 – 13) "Opening 24 is directly in-line with the conduit's longitudinal axis, thereby providing a substantially straight and unrestricted respiratory flow path to ambient." (Page 7, lines 18 – 20) "Valve assembly 50 consists of a compound linkage that moves diaphragm 44 from an open position (shown by FIG. 2) to a closed position (shown by FIG. 5), and vice-versa. When diaphragm 44 is at the open position, **it is located to the side of conduit 20, completely out of the respiratory flow path.**" (Page 7, lines 22 – 26, emphasis added)

The configuration, placement and dimensions of the various components that make up the quadrilateral compound linkage of the instant invention **are unusual and not obvious**. The assembly must be carefully designed to achieve the desired movement of the sealing means to the side of the snorkel when the valve is open. **It is the opening movement of the sealing means to the side of the snorkel tube, away from the respiratory flow path, that**

distinguishes the instant invention over the state-of-the-art. The specification teaches: "The lengths of links 60 and 70; and the relative positions of pivots 62, 64, 72 and 74 are chosen to form a quadrilateral linkage assembly that moves diaphragm 44 from the open to the closed positions, and vice-versa. Referring to FIG. 7, link 60 is distance R60 long. Link 70 is distance R70 long. Pivots 62 and 72 are distance R62 apart. Pivots 64 and 74 are distance R74 apart. R60, R70, R62 and R74 form a four-sided polygon." (Page 7, lines 35 and 36; page 8, lines 1 - 4)

The specification goes on to say: "The dimensions of R60, R70, R62 and R74; and the locations of pivots 62 and 72 on arm 52; and the locations of pivots 64 and 74 on conduit 20; are carefully chosen so that assembly 50 will either hold diaphragm 44 **to the side of conduit 20 out of the respiratory flow path** as shown by FIG. 2 (the "open" position), or place diaphragm 44 over and against opening 24 as shown by FIG. 5 (the "closed" position). Furthermore, the dimensions and locations are chosen so that valve assembly 50 is stable only when at either the fully open or completely closed positions." (Page 8, lines 5 - 12, emphasis added).

With respect to independent claims 1, 12 and 15 of the instant invention, the respective claims state "said sealing means is moved by said linkage substantially out of the ambient air flow path when said buoyant means is above the water surface." (Claim 1, last three lines); and "said sealing means adapted to be not in the ambient fluid flow path when said buoyant means is out of the water." (Claim 12, last two lines); and "said sealing means having an open position that does not substantially interfere with the flow of fluid into and out of said conduit first end;" (Claim 15, last three lines of paragraph 5); all of which distinguish the instant invention over the prior art.

With respect to Claims 2 and 3, Ferraro does not disclose a valve incorporating a compound linkage, or a linkage forming a four-sided polygon.

Instead, the Ferraro valve "comprises a floating body and a closing device, **which are independent from one another.**" (Col. 1, lines 30 – 32; emphasis added). Ferraro also states "the subject valve comprises a plug or closing device, which is **fitted upon an oscillating arm**, and a buoyant body, which also is **similarly fitted on an oscillating arm**, the position of which is parallel to the former arm, the pivoting axis of both arms being fitted on the breathing tube and this **axis being the same for both arms**, whereby each of these arms can **operate independently from one another.**" (Col. 1, lines 39 – 46; emphasis added). The independent arms taught by Ferraro are not joined to function as a compound linkage. Furthermore, joining or linking the two arms disclosed by Ferraro will not give the results taught by the instant invention, but will render the Ferraro valve inoperative. The compound linkage taught by the instant invention is neither anticipated nor rendered obvious by the prior art

Reiterating, the instant invention discloses a sealing means carried by a quadrilateral compound linkage that is configured to move the sealing means out of the reparatory flow path when the valve is open. The dimensions and placement of the components that make up the quadrilateral compound linkage must be carefully chosen to obtain the desired movement of the sealing means. The configuration, placement and dimensions of the linkage components are unusual and not obvious. In contrast, Ferraro discloses a sealing means carried by a single arm (1) that "swings about hub 2" (col. 2, line 6) having a center point 3. FIG. 1 of Ferraro shows the sealing means at the open position, in close proximity to and thereby obstructing the snorkel tube opening. Ferraro does not teach or suggest that the sealing means be moved out of the respiratory flow path. In fact, **the valve assembly disclosed by Ferraro cannot move the sealing means out of the respiratory flow path.** Furthermore, Ferraro does not teach or suggest that the two independent arms can be linked to form a quadrilateral compound linkage because if they are linked together the valve will become inoperative.

With respect to Claim 5, buoyant body 6 is not carried by a linkage as taught by the instant invention. Instead, Ferraro teaches: "There is also pivoted at point 3 an arm 5 having buoyant body 6 disposed on the outer end thereof." (Col. 2, lines 8 – 10) As described supra, buoyant body 6 is carried by another single arm that moves independently of the arm (1) carrying the sealing means (4).

With respect to Claim 6, Ferraro does not teach, suggest or illustrate a control means joining the buoyant body to a linkage. Ferraro teaches that 2 is a hub having a center point (axis) located at 3. Both arms (1 and 5) pivot independently about a common axis centered at point 3.

As described supra, with respect to Claim 12, Ferraro does not teach or suggest that the sealing means is adapted to not be in the ambient fluid flow path when said buoyant means is out of the water. Ferraro's sealing means (plug 4) is always directly in line with and obstructing the flow path. FIG. 1 of Ferraro clearly shows plug 4 obstructing the respiratory flow path even when in the open position.

As described supra, with respect to Claim 15, Ferraro does not teach or suggest that the sealing means has an open position that does not substantially interfere with the flow of fluid into and out of the snorkel.

In summary: Chen-Lieh discloses an ordinary snorkel having an internal valve that directs exhalation out an exhaust valve below the mouthpiece. Chen-Lieh does not disclose a method whereby water is prevented from entering a snorkel. Ferraro discloses a method to block the flow of water into the inverted opening of a snorkel by using a plug (sealing means) mounted on a single arm that is independent from a floating body mounted on another single arm, both arms pivoting about a common axis. Neither Chen-Lieh nor Ferraro, separately or in combination, teach or anticipate a valve that is mounted on a compound linkage especially configured so that the sealing means resides to the side of

the upright opening of a snorkel, completely out of the respiratory flow path, when the valve is open. The instant invention's compound linkage is **unusual and not obvious**. Furthermore, joining or linking the two arms disclosed by Ferraro will not give the results taught by the instant invention and will render the Ferraro valve inoperative.

Claims 1- 18 remain in the application. No claims have been canceled. No new claims have been presented. Claims 1 and 14 have been amended to properly establish antecedent basis. Neither Chen-Lieh nor Ferraro, either separately or in combination, teach or suggest the snorkel taught by the instant invention. The applicant respectfully submits that each of claims 1- 18 is not anticipated or obvious by any of the references of record, taken individually or in view of one another, that each of the claims does meet the requirements of 35 U.S.C. 102, 103 and 112 and is allowable. Consequently, a Notice of Allowance in this application respectfully is requested.

Attached hereto is a marked-up version of the changes made by amendment. The attachment is captioned "**Version with markings to show changes made.**"

In the event that the Examiner further questions the allowance of any of the claims, it is respectfully requested that the Examiner telephone the applicant at number (209) 375-6485 or (831) 685-1497 in order to discuss the application and to expedite the prosecution thereof.

Respectfully submitted,



TONY CHRISTIANSON,

Applicant

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The Abstract of the Disclosure has been amended as follows:

– – The instant invention is a valve mounted on the above water end of a skin diving snorkel. ~~for the top end of skin diving snorkels having a conduit with an open end above the water surface, and an underwater end that terminates in a mouthpiece. The mouthpiece provides a flow path between the conduit and the interior of the diver's mouth. The conduit's above water valve's opening is in-line with the conduit's snorkel's longitudinal axis, thereby providing a substantially straight and unrestricted respiratory flow path. The top valve consists of a soft diaphragm mounted on a compound linkage. The linkage is attached to the conduit adjacent the top valve opening. A float activates the valve linkage whenever the snorkel starts to descend below the water surface. By the time the open end of snorkel is underwater, the linkage has moved the diaphragm over and against the top valve opening thereby preventing water from entering the snorkel conduit. Conversely, when the valve end top of the snorkel is above the water surface, the linkage moves the diaphragm is moved by the linkage to the side of the snorkel conduit, completely away from the top opening and out of the respiratory flow path.~~– –

In the claims:

Claims 1 and 14 have been amended as follows:

1. A snorkel device comprising:

a conduit adapted to extend above ~~the~~ a water surface;

said conduit having a longitudinal axis;

said conduit having first and second ends thereof;

said conduit first end adapted to admit air into said conduit when said conduit first end is above the water surface;

said ambient air flows unrestricted into said conduit first end along a flow path that is substantially inline with the longitudinal axis of said conduit;

mouthpiece joined to said conduit second end for communicating fluid flow with said conduit;

linkage adjacent said conduit first end;

buoyant means for controlling the movement of said linkage; and sealing means carried by said linkage, said sealing means substantially prevents the flow of ambient fluid into said conduit when at least a portion of said buoyant means is underwater; said sealing means is moved by said linkage substantially out of the ambient air flow path when said buoyant means is above the water surface.

14. The snorkel device recited in claim 13 wherein:

~~the~~ movement of said linkage is controlled by said buoyant means.